

### Formula key

$P_0$  = Asset's price today (at time 0)

$CF_n$  = Cash flow expected at time  $t$

$t$  = time

$r$  = required return. Discount rate that reflects the asset's risk.

$n$  = Assets life / period it distributes cash flows

$\$C$  = Coupon payment amount

$\$M$  = par value maturity amount

### Required rate of return

The rate of return that investors expect or require an investment to earn given its risk.

Riskier = higher the return required by investors in the marketplace

Purchase of investment means investor loses the opportunity to invest their money in another asset. Opportunity cost.

$$P_0 = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \dots + \frac{CF_n}{(1+r)^n}$$

### Asset valuation basics

In a market economy, ownership of an asset confers rights to stream of benefits generated by asset.

Benefits may be tangible, such as interest payments on bonds, or intangible, e.g. viewing a beautiful ring

**Asset value** = present value of all its future benefits

Finance theory focuses on tangible benefits, usually cash flows an asset pays over time

e.g. landlord. Incoming = Rental payments from tenants. Outgoing = Liabilities for maintaining premises, paying taxes, etc.

When selling an asset the market price should equal present value of all future net cash flows

Step 1: Estimate \$\$ an investment distributes over time

Step 2: Discount expected cash payments using time value of money maths

### Asset valuation basics (cont)

Therefore pricing an asset requires knowledge of

- its future benefits
- the appropriate discount rate to convert future benefits into a present value

### Certainty

If an assets future benefits are uncertain then investors will apply a larger rate when discounting those benefits to present value

An inverse relationship exists between risk and value

Investors will pay a higher price for investment with more credible promise.

Riskier investments must offer higher returns

**Marginal benefit of owning an asset** = right to receive cash flows it pays

**Marginal cost** = opportunity cost of committing funds to this asset rather than to an equally risky alternative

### Bond features

Floati ng- rate bonds Bonds that make coupon payments that vary through time. The coupon payments are usually tied to a benchmark market interest rate

also called variable-rate bonds

provide some protection against interest rate risk

If market interest rates increase, then eventually, so do the bond's coupon payments

### Bond features (cont)

Makes borrowers future cash obligations unpredictable

Risk is transferred from buyer to issuer

London Interbank Offered Rate (LIBOR) The interest rate that banks in London charge each other for overnight loans. Widely used as a benchmark interest rate for short-term floating rate debt.

Cash rate Rate Aus banks charge each other for overnight loans

Spread The difference between the rate that a lender charges for a loan and the underlying benchmark interest rate

Also called the credit spread

to the benchmark interest rate, according to the risk of the borrower

Lenders charge higher spreads for less creditworthy borrowers

Capital indexed bonds / inflation linked bonds Issued by Aus govt, face value changes each year with inflation



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### Bond features (cont)

**Unsecured debt** Debt instruments issued by an entity backed only by faith and credit score of borrowing company

**Subordinated unsecured debt** Debt instruments issued by an entity which is backed only by the credit of the borrowing entity which is paid only after senior debt is paid

**Collateral** The specific assets pledged to secure a loan.

**Mortgage bonds** A bond secured by real estate or buildings

**Collateral trust bonds** A bond secured by financial assets held by a trustee

**Debentures** Usually backed by property

**Equipment trust certificates** A bond often secured by various types of transportation equipment certificates

**Pure discount bonds** Bonds that pay no interest and sell below par value. Also called zero-coupon bonds.

**Convertible bond** A bond that gives investors the option to convert their bonds into the issuer's common stock.

### Bond features (cont)

**Exchangeable bonds** Bonds issued by corporations which may be converted into shares of a company other than the company that issued the bonds.

**Callable** Bonds that the issuer can repurchase from investors at a predetermined price known as the call price

**Call price** The price at which a bond issuer may call or repurchase an outstanding bond from investors

**Puttable bonds** Bonds that investors can sell back to the issuer at a predetermined price under certain conditions

**Sinking fund** A provision in a bond indenture that requires the borrower to make regular payments to a third-party trustee for use in repurchasing outstanding bonds, gradually over time

**Protective covenants** Specify requirements that the borrower must meet as long as bonds remain outstanding

### Bond Vocabulary

Fundamentally, a bond is just a loan

Bonds make interest-only payments until they mature

**Principal** The amount of money on which interest is paid

**Maturity date** The date when a bond's life ends and the borrower must make the final interest payment and repay the principal.

**Par value (bonds)** The face value of a bond, which the borrower repays at maturity

Typically \$1,000 for corporate bonds

**Coupon** A fixed amount of interest that a bond promises to pay investors

Usually semiannually

**Indenture** A legal document stating the conditions under which a bond has been issued

Specifies dollar amount of coupon

Specifies when the borrower must make coupon payments

**Coupon rate** The rate derived by dividing the bond's annual coupon payment by its par value.

**Coupon yield** The amount obtained by dividing the bond's coupon by its current market price (which does not always equal its par value). Also called current yield

Might have additional features:



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### Bond Vocabulary (cont)

- **Call feature** allows the issuer to redeem the bond at a predetermined price prior to maturity
  - **Conversion feature** grants bondholders right to redeem bonds for a predetermined number of shares of stock in borrowing firm
- Premium** A bond that sells for more than its par value
- Selling at a better than market return
- As more investors buy the price goes up
- Yield to maturity** The discount rate that equates the present value of the bond's cash flows to its market price
- Discount** A bond sells at a discount when its market price is less than its par value
- Might be offset with a built-in gain at maturity

### Changes in Issuer Risk

- When macroeconomic factors change
- Yields may change simultaneously on a wide range of bonds
  - Return on a particular bond can also change as market reassesses borrower's default risk (risk issuer could default on payments)
  - Changes may be positive or negative

### Issuer types

**Treasury bonds** Debt instruments issued by the federal government with maturities of up to 30 years

### Issuer types (cont)

- Corporate bonds** Issued by corporations
- Finance new investments
  - Fulfill other needs
  - Range from 1 - 100 years
  - Under 10 years usually called a *note* means the same
  - Most corporate bonds have a par value of \$1,000 and pay interest semiannually
- Australian government bonds** Issued by Australian government

### Bond Markets

- Larger than the stock market
- Bond Price Quotations**
- bond prices are quoted as a percentage of par values
- Yield spread** The difference in yield to maturity between two bonds or two classes of bonds with similar maturities
- Basis point** 1/100 of 1 percent; 100 basis points equal 1.000 percent
- Bond ratings** Letter ratings assigned to bonds by specialized agencies that evaluate the capacity of bond issuers to repay their debts. Lower ratings signify higher default risk.
- Junk bonds** Bonds rated below investment grade. Also known as high-yield bonds

### Basic bond valuing equation

Bond makes a fixed coupon payment each year

$$P_0 = C / (1 + r)^1 + C / (1 + r)^2 + \dots + C / (1 + r)^n + M / (1 + r)^n$$

### Semiannual Compounding

Most bonds make 2 payments a year

$$P_0 = (C / 2) / (1 + r)^1 + (C / 2) / (1 + r)^2 + \dots + (C / 2) / (1 + r)^{2n} + M / (1 + r)^{2n}$$

### Factors affecting bond prices

A bonds market price changes frequently as time passes

### Term to maturity

Whether a bond sells at a discount or a premium, its price will converge to par value (+ final interest payment) as maturity date draws near.

### Economic Forces

Most important factor is prevailing market interest rate

### Required return

When required return on a bond changes, bonds price changes in opposite direction

Higher bonds required return = lower its price, and vice versa

### General lessons

Bond prices and interest rates move in opposite directions

Prices of long-term bonds display greater sensitivity to changes in interest rates than do prices of short-term bonds

### Interest Rate Risk

Risk that changes in market interest rates will move bond price

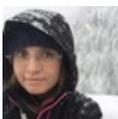
Interest rates fluctuate widely, so investors must be aware of interest rate risk

Inherent in these instruments

Inflation is a main factor

### Important because

- When investors buy financial assets, they expect these investments to provide a return that exceeds inflation rate.



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### Interest Rate Risk (cont)

- Investors want to achieve a better standard of living by saving and investing their money
- If asset returns do not exceed inflation investors are not better off for having invested

### Real return

Bond yields must offer investors a positive real return

Approximately equals difference between stated or nominal return and inflation rate

### Bond Markets

Many types of bonds in modern financial markets

Many bonds provide a steady, predictable stream of income

Others have exotic features that make returns volatile and unpredictable

Bond trading occurs in either primary or secondary market

#### Primary market trading

Initial sale of bonds by firms or government entities

Might be through auction process

With help of investment bankers who assist bond issuers with design, marketing, and distribution of new bond issues

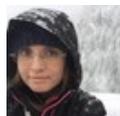
Once issued in primary market, investors trade them with each other in secondary market

Often purchased by institutional investors who hold bonds for a long time

#### Secondary market

Because institutions hold bond for a long time, trading in bonds can be somewhat limited

But bond market is large which means investors have a wide range of choices



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